PATENT
Attorney Docket No. 01165.0782-00000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	
Yoshinori KAMI et al.	Group Art Unit: 1772
Application No.: 09/530,447	Examiner: M. Patterson
Filed: April 28, 2000	Confirmation No.: 6878
For: AIR BAG	

Attention: Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF UNDER BOARD RULE § 41.37

In support of the Notice of Appeal filed August 7, 2006, and further to Board Rule 41.37, Appellants present this brief and enclose herewith a check for the fee of $500.00 required under 37 C.F.R. § 41.20(b)(2).

This Appeal responds to the April 5, 2006 final rejection of claims 9-20.

If any additional fees are required or if the enclosed payment is insufficient, Appellant requests that the required fees and payment be charged to Deposit Account No. 06-0916.

Real Party In Interest

ASAHI KASEI KABUSHIKI KAISHA is the real party in interest.

Related Appeals and Interferences

There are currently no other appeals or interferences, of which appellants, appellants' legal representative, or assignee are aware, that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status Of Claims

Claims 1-8 and 21 stand cancelled. Claims 9-20 stand finally rejected and are being appealed.

Status Of Amendments

There were no amendments filed subsequent to the final rejection.

Summary Of Claimed Subject Matter

Claims 9, 10, and 17 are the three independent claims involved in the appeal, each of which is directed to an air bag. Parenthetical references are to page and line numbers in the specification.

Claim 9 is an air bag formed of two woven fabrics interwoven with each other to be a bag-shaped body (p. 4, l. 29-31; p. 5, l. 17-20), the fabrics being composed of polyamide fiber yarns containing copper compounds at 30 to 200 ppm (p. 4, l. 31-33; p. 11, l. 19-22), in a mixture of halogenated alkali metal (p. 6, l. 28-33; p. 11, l. 10-18).

Claim 9 also sets forth six properties or parameters for the filaments, yarns, and fabric of the air bag. These are total fineness of the yarn in the range of 66 decitex to 167 decitex; each filament in the yarn having a fineness in the range of 1 to 3.3 decitex;

the product of fabric fineness multiplied by weave density being not more than 16000 decitex/2.54 cm; the fabric having the load at 15% tensile elongation in the range of 3 to 35N/%/2.54cm; a tensile work at break in the range of 7000 to 30000 N•%/2.54 cm, and fabric strength at break in the range of 740 to 1010 N/2.54cm (p. 4, l. 34-p. 5, l. 14; p. 6, l. 18-25; p. 7, l. 6-8; p. 9, l. 2-8; p. 9, l. 24-27; p. 10, l. 9-13; Table 1, p. 19; Table 2, p. 20).

Claim 10 is an air bag formed of a woven fabric, the fabric being sewn or bonded to have a three-dimensional contour (p.5, l.4-14; p.6, l.2-6). The fabric is composed of polyamide fiber yarns with the same copper compound and copper concentration as in claim 9, and the same pages and line numbers thus apply.

Claim 10 also sets forth the six properties or parameters for the filaments, yarns, and fabrics of the air bag, and the same pages and line numbers thus apply.

Claim 17 is an air bag comprising a woven fabric (p. 4, l. 29-31; p. 5, l. 4-14; p. 5, l. 17-20; p. 6, l. 2-6). The fabric is composed of polyamide fiber yarns with the same copper compound and copper concentration as in claim 9, and the same pages and line numbers thus apply.

Claim 17 also sets forth the six properties or parameters for the filaments, yarns, and fabrics of the air bag, and the same pages and line numbers thus apply.

Grounds of Rejection to be Reviewed on Appeal

A. Claims 10, 11, 13, 15, and 17-21 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Toray Industries (Japanese Patent No. 0790747), of record on page 2 [3] of the previous Action (June 30, 2005).

B. Claims 9, 14, and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Toray Industries (Japanese Patent 0790747) in view of Smith et al. (U.S. Patent No. 5,378,019), of record on page 2 [4] of the previous Action (June 30, 2005).

C. Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Toray Industries (Japanese Patent No. 0790747) in view of Mizuki et al. (U.S. Patent No. 5,637,385), of record on page 2 [5] of the previous Action (June 30, 2005).

Argument

I. THE AIR BAG OF THE PRESENT INVENTION PROVIDES A UNIQUE SOLUTION TO PROBLEMS CONFRONTING THE ART

The development of the present invention culminated in an air bag in which weight and thickness (volume) were reduced significantly yet the mechanical properties of the air bag were not degraded, and durability against long-term aging, including heat-aging, wet heat-aging, and ozone-aging was maintained. The basis weight and thickness of the fabric for this air bag were reduced by about 20%, preferably 30% or more, when compared with a conventional base fabric used in a conventional air bag. (See application, page 3, line 30 to page 4, line 19.)

A. Tensile Work At Break Discovery

During the making of the invention, applicants discovered that tensile work at break was significant to achieving this reduction in weight and thickness. The applicants noted during their study that the dynamic load exerted on the air bag was larger at the stage when the air bag was projected forward to a maximum extent (See application, Fig. 1(3)) than at the stage when the air bag inflates to a maximum extent and restrains the occupant. (See application, page 8, line 22 to page 9, line 1.) The unexpected result of this study was that tensile work at break was more significant than tensile strength at break. Thus, tenacity of the air bag became determined both by the mechanical strength of the fabric and on the important discovery of the amount of tensile work at break of the fabric.

Tensile work of a fabric can be correlated to the basis weight of the woven fabric if the kind of yarn is specified. It is significant in the present invention that an unnecessarily large tensile work at break is contradictory because weight reduction and compactness of the present air bag are important requisites. Because the kinetic energy of the air bag when projected forward must be absorbed by the tensile work of the woven fabric forming the air bag, the woven fabric forming the air bag must have sufficient tensile work at break to absorb the kinetic energy but must not be unnecessarily large. Tensile work at break is specified in the three independent claims 9, 10, and 17 in the range of 7,000 to 30,000 N•%/2.54 cm.

B. Yarn Fineness And Load At 15% Elongation Are Also Significant

The desired weight reduction and pliability and thereby a favorable compactness of the inventive air bag is achieved, provided the fabric comes within the claimed range

for tensile work at break stated above and is composed of yarns (warp and weft), each consisting of a plurality of filaments having a total fineness in the range from 66 to 167 decitex, as claimed in claims 9, 10, and 17. The claimed range of the load at 15% elongation of the fabric is 3 to 35 N/%/2.54 and is specified in order to obtain a pliable air bag that prevents occurrence of injury of the vehicle occupant at impact.

Other claimed parameters include a single filament fineness in the range from 1.0 to 3.3 decitex, as claimed in claims 9, 10, and 17. The woven fabric of the present invention is set forth in the claims in terms of weave fineness, which is a product of total fineness of warp or weft multiplied by weave density, the claimed parameter being 16000 decitex•end or pick, respectively,/2.54 cm or less. The basis weight of woven fabric is directly correlated to the weave fineness. These claimed mechanical properties described above are maintained even after the air bag has been exposed to prolonged periods of heat-aging, wet heat-aging, and ozone-aging.

C. The Primary Reference Is An Admitted Failure

The Japanese patent publication to Toray Industries ("Toray") relied upon by the Examiner as the primary reference in rejecting the claims does not, as will be shown, teach or even suggest the unique solutions of the present invention including the importance of tensile work at break. Indeed, the Examiner agrees that:

> Toray Industries fails to disclose a product of fineness of warp or weft multiplies by weave density less than 16000 decitex times end or pick per inch, a load at 15% elongation in the range of 3 to 35N/%/inch and tensile work at break of 7000 to 30,000N%/2.54 cm, fineness of weft multiplied by weave density which is larger than the fineness of warp multiplied by weave density, yarns having a fineness from 66 to 167 decitex and a tensile strength of 5.4 cN/dtex or greater and a value of fabric strength at break in a range of

from 740 to 1010 N/2.54 cm. (See Office Action of June 30, 2005, page 3.)

Yet the Examiner in the face of the above admission still rejected all claims and repeated these groundless rejections in the final Office Action by incorporating the June 30, 2005 Office Action where this admission occurs.

II. THE IMPROVEMENTS PROVIDED BY THE PRESENT INVENTION ARE UNMET BY THE CITED REFERENCES WHETHER TAKEN ALONE OR IN COMBINATION

A. An Assertion of Obviousness as to Claims 10, 11, 13, 15, and 17-20 Based on Toray Finds No Support in this Reference

Even though Toray is an admitted failure, the Board's attention is invited to this publication, especially the translation of Toray (Exhibit 1), a copy of which was provided to the undersigned attorney by the PTO by facsimile on August 22, 2003. The Toray translation relates to a base fabric for use in an uncoated air bag. The fabric is formed of nylon or polyethylene terephthalate yarn having a yarn size greater than 210 denier (approximately 231 dtex). Toray's base fabric is said to have improved mechanical properties, particularly tear strength, air-permeability and flame-proofing, while being light in weight, with good softness and stowability and can be used as a base fabric for an uncoated air bag in place of a rubber-coated base fabric[1].

In paragraphs 0027 and 0028, Toray discusses the limitation on the minimum fineness of the fiber yarns in order to satisfy the mechanical properties:

[1] Table A and Table B (Exhibits 2 and 3 herein) were prepared by the assignee and filed with the RCE of August 25, 2003. Table A relates to the present invention, and Table B sets forth Toray's examples and comparative examples. Certain of the data of Table B was obtained from the Toray publication, and the remainder of the data was obtained by calculation.

> "in order to consider as the level which it can be satisfied of the mechanical property of a base fabric practically, as for a minimum, it is desirable that it is 210 deniers."

Independent claims 10 and 17 (as does independent claim 9) specifically recite that the polyamide fiber yarns have a fineness in the range of 66 decitex to 167 decitex, a range lower than and unsought by Toray. Toray states that as a minimum it is desirable that the fineness be 210 deniers (approximately 231 dtex) in order to satisfy the mechanical properties (e.g., tensile strength, tensile elongation, tear strength). As stated above, the Examiner confirms in his admission that Toray fails to disclose the claimed fineness range of 66 to 167 decitex.

A fair interpretation of Toray leads to the conclusion that it would not be possible to use a yarn fineness having a decitex of 66 to 167, far less than Toray's lower limit of 210 denier (231 decitex), to produce a woven fabric for use in making a lightweight airbag. In accordance with the teachings of Toray, a woven base fabric for an airbag is designed by relying on the tensile strength at break of the base fabric and stating that 210 denier yarn is the desirable minimum for attaining the objective mechanical properties. Because the Toray teachings lack any understanding of the importance of tensile work at break of fabric and thus specify 210 denier as the lower limit for yarn fineness, a skilled person in the art would not be led to employ the claimed range of yarn fineness when striving for a lighter and thinner air bag, yet one that can resist dynamic load upon inflation.

Although a skilled artisan would not use fiber yarns less than 210 denier (231 dtex) for an air bag, and especially those yarns whose total fineness is in the claimed range of 66 dtex to 167 dtex, because Toray believes they would not be effective, the Examiner completely disregards this fact. Instead, the Examiner

contradicts Toray by stating in the final Office Action just the opposite: "Toray does not limit the fineness to only greater than 210 denier...." (final Office Action, page 3).

The Examiner further baldly asserts that a skilled artisan "would not be taught away from selecting a fineness which is less than 210 denier depending on the desired properties of the end product." Id. There is no basis in the record for this statement. If it is the "end product" on which the Examiner relies for support, the only end product is that of Toray, which teaches away from lowering further the lower limit of 210 denier. If the Examiner is alluding to the specification or claims of the present invention as an example of "the desired properties of the end product," then this is hindsight and improper. It is submitted that the limitation relating to yarn fineness alone makes claims 10 and 17 (and claim 9) and their respective dependent claims unobvious.

The distinctive parameters of tensile work at break and the load at 15% tensile elongation, discussed above, are not recognized by Toray and are not taught or suggested by Toray. If the fabrics have the tensile work at break in the claimed range of 7000 to 30,000 N%/2.54cm and the load at 15% tensile elongation in the claimed range of 3 to 35 N/%/2.54cm, then even though the value of fabric strength at break is in the claimed range of 740 to 1010 N/2.54cm, which is a low value, it was nevertheless found by applicants that an excellent air bag is obtained. This air bag is lighter in weight, and soft and pliable so as to prevent occurrence of injury of the vehicle occupant at impact where kinetic energy is absorbed and breakage of the air bag is prevented at maximum projection.

Because the discovery of tensile work at break was not recognized by Toray, and is taught in the present invention to be a parameter distinctive from fabric strength at

break, a skilled artisan limited to Toray with no knowledge of this discovery would be unable to establish that the differences between claims 10 and 17 (and claim 9) and Toray are obvious or are just an optimization of fabric or tensile strength at break.

A further distinction over Toray is the level of weave fineness. It is submitted that the range of 21000-31000 of Toray is at an entirely different level from the property of weave fineness recited in the claims even though the fabrics of Toray and the claims have almost the same cover-factor values. This property of weave fineness is the product of fineness of warp and weft in the fabric multiplied by the weave density, the product as claimed being not more than 16000 decitex•end or pick/2.54 cm. Thus, this marked difference between the range in Toray and this claimed property makes clear that not only is Toray also out of the scope of claims 10 and 17 (and claim 9) as to this property, but there is no objective evidence for "optimizing" Toray to put it within this scope.

The value of Toray's fabric strength at break is 1561-1827 N/2.54 cm and is larger than the claimed range of 740-1010 N/2.54 cm of the present invention because Toray employs fiber yarns which must have a total fineness of 210 denier (231 dtex) or more. Therefore, the limitation of the claimed value of fabric strength at break could not be derived by a skilled artisan by routine optimization of Toray's disclosure because the claimed low values of applicants would not be viewed as an effective range for this artisan to pursue to obtain the good results that applicants obtained.

Based on the calculation in Table B, the level of the estimated basis of weight of the uncoated woven base fabrics of Toray's Examples and Comparative Examples is 170 to 244 g/m^2. These levels of basis of weight of Toray fabrics are similar to those of

conventional base fabrics referred to in the present application. (See application, page 3, line 30 to page 4, line 21). In contrast, the level of measured basis of weight of the six present Examples in Table A is 94 to 125 g/m^2. Thus, in contrast to a conventional base fabric as in Toray, the desired reduction of basis weight of 20%, preferably 30% of more, is achieved by the present invention.

The major differences between the values expressed in the three independent claims and those of Toray cannot be ignored in determining obviousness. The ability to drastically reduce weight and volume of an air bag by decreasing the basis weight of a woven fabric by 20% and preferably by 30% or more by including, inter alia, the above identified total fineness of the yarns and tensile work at break has not been achieved in the cited art. The cited Toray patent publication has been shown to be so limited in its concept and disclosure when compared to the claimed invention and its result that no one skilled in the art would rely on Toray's teachings to conclude that the present invention is obvious.

B. The Attempt to Rectify the Failures of Toray by Resorting to "Optimization" is Legally Unsound

The Examiner's reply to these significant differences between the present claimed invention and Toray, in addition to the unsupported contention that "more is less" where a lower limit of yarn fineness is concerned, is that it's merely "optimization." For example, the Examiner argues that "optimization of tensile strength is therefore also optimization of tensile work at break and load at 15% tensile elongation" (final Office Action, page 4) because both of these parameters are based on strength. This allegation not only lacks logic but is made in the face of a complete void in the teachings

of Toray as to both parameters and a lack of recognition of these parameters as important to the attainment of an improved air bag as described in the subject application.

Although the Examiner uses the term "optimization" in the final Office Action but cites no case, he is likely referring to In re Boesch and Slaney, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) which was cited repeatedly in Office Actions prior to the final Action. The Examiner argued that the claimed values not taught in Toray were mere optimizations of known variables, even though there is no recognition in Toray that certain of these factors exist or are important at all in obtaining satisfactory mechanical properties for an air bag. This broad generalization even though unsupported and inapplicable here has known exceptions, an example being where the parameter is not recognized to be a result-effective variable. In re Antonie, 559 F.2d 618, 620, 195 USPQ 6, 8-9 (CCPA 1977); see also In re Yates, 663 F.2d 1054, 1056-57, 211 USPQ 1149, 1151-52 (CCPA 1981) (finding claimed process was not obvious where factor being optimized was not recognized to be a result-effective variable). As stated above, Toray does not teach or recognize tensile work at break and the load at 15% tensile elongation as important parameters for an air bag. Because there is this absence of recognition in Toray that these two parameters are result-effective variables, the decision in In re Boesch and Slaney, were it applicable, would be readily distinguished by Antonie because a parameter that is not recognized as a result-effective variable cannot be "routinely optimized."

C. The Addition of the Smith et al. Patent in the Rejection of Claims 9, 14, and 16 Fails to Correct the Deficiency of Toray

Independent claim 9 has been distinguished over Toray in the presentation of Sections A and B above, and the arguments therein are hereby incorporated into this section.

The Smith et al. patent was cited because it taught an air bag comprising two woven fabrics which are interwoven with each other and is circular. No attempt was made by the Examiner to address the shortcomings of Toray and understandably so because of the absence in Smith et al. of a teaching or suggestion of the unique parameters of the present invention as discussed above.

Furthermore, the Smith et al. air bag is formed preferably of a neoprene backing layer. Because the Toray air bag employs a base fabric for an uncoated air bag, an attempt to provide Toray with a neoprene backing layer would be contrary to Toray's teachings and unsupportable for this reason alone. There is no prima facie basis for combining the Smith et al. patent with Toray; and to the extent these two patents might be combinable, they fail to suggest or make obvious the concepts and language of claims 9, 14, and 16.

D. The Addition of Mizuki et al. Does Not Correct Toray and Fails to Teach or Suggest the Language of Claim 12

Mizuki et al. discusses the well-known factor of birefringence, but this discussion does not correct the many shortcomings of Toray discussed above, nor does the Examiner so contend. Further, Mizuki et al. does not even teach the requirement in claim 12 that the birefringence of the weft is larger than that of the warp. The Examiner's solution is again "routine optimization" until the birefringence of the weft is

larger than that of the warp. Not only does this approach deprecate the invention, it overlooks completely the technical significance of this claimed feature, namely, to make the mechanical properties substantially the same in the warp and weft directions of the fabric. (See application, page 10, lines 26 to 36.) While it is arguable that Toray would have birefringence as high as needed for obtaining a high-strength yarn, the technical relationship of warp yarn to weft yarn, as recited in claim 12, is neither taught nor made obvious by either Toray or Mizuki et al. Additionally, neither of their respective teachings lays a groundwork for invoking the "routine optimization" solution of the Examiner which he unrelentingly employs if a reference is deficient.

III. CONCLUSION

For the reasons given above, pending claims 9-20 are allowable, and reversal of the Examiner's rejection is respectfully requested.

To the extent any extension of time under 37 C.F.R. § 1.136 is required to obtain entry of this Appeal Brief, such extension is hereby respectfully requested. If there are any fees due under 37 C.F.R. §§ 1.16, 1.17, or 41.20 which are not enclosed herewith, including any fees required for an extension of time under 37 C.F.R. § 1.136, please charge such fees to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: October 5, 2006

By: _____
Tipton D. Jennings
Reg. No. 20,645

Claims Appendix to Appeal Brief Under Rule 41.37(c)(1)(viii)

9. An air bag formed of two woven fabrics interwoven with each other to be a bag-shaped body, each composed of polyamide fiber yarns containing a copper compound in a mixture of a halogenated alkali metal, the copper compound selected from a group consisting of a copper salt and a halogenated copper, and having a copper concentration in the range of 30 to 200 ppm, and the polyamide fiber yarns having a total fineness in the range of from 66 decitex to 167 decitex and the yarn containing a plurality of single filaments, each filament having a fineness in the range of 1 to 3.3 decitex, wherein the product of fineness of the warp or weft of the fabric multiplied by the weave density of the fabric being not more than 16000 decitex•end or pick, respectively, /2. 54 cm, the fabric having the load at 15% tensile elongation in the range of 3 to 35 N/%/2.54 cm, the tensile work at break in the range of 7000 to 30000 N•%/2.54 cm, and a value of fabric strength at break in a range from 740 to 1010 N/2.54 cm.

10. An air bag formed of a woven fabric composed of polyamide fiber yarns containing a copper compound in a mixture of a halogenated alkali metal, the copper compound selected from a group consisting of a copper salt and a halogenated copper, and having a copper concentration in the range of 30 to 200 ppm, and the polyamide fiber yarns having a total fineness in the range of from 66 decitex to 167 decitex and the yarn containing a plurality of single filaments, each filament having a fineness in the

range of 1 to 3.3 decitex, wherein the product of fineness of the warp or weft of the fabric multiplied by the weave density of the fabric being less than 16000 decitex •end or pick, respectively, /2.54 cm, the fabric having the load at 15% elongation in the range of 3 to 35 N/%/2.54 cm and the tensile work at break in the range of 7000 to 30000 N•%/2.54 cm, and a value of fabric strength at break in a range from 740 to 1010 N/2.54 cm, the fabric being sewn or bonded to have a three dimensional contour.

11. An air bag as defined by claim 9 or 10, wherein the product of the fineness of weft multiplied by the weave density of weft is larger than the product of the fineness of warp multiplied by the weave density of warp.

12. An air bag as defined by claim 9 or 10, wherein the weft and warp forming the woven fabric each have a birefringence and the bireinfringence of the weft is larger than that of the warp.

13. An air bag as defined by claim 9 or 10, wherein the weave is selected from a plain weave, a rip-stop weave and a mat weave.

14. An air bag as defined by claim 9, wherein the bag-shaped air bag is of a circular shape as seen in plan view.

15. An air bag as defined by claim 9 or 10, wherein the yarns forming the woven fabric have a tensile strength in the range of 5.4 to 7.5 cN/decitex, and a tensile work at break in the range of 1.32 to 2.65 cN•cm/decitex.

16. An air bag as defined by claim 9 or 10, wherein the air bag is selected from those for a driver's seat, for a passenger's seat and for side impact protection.

17. An air bag comprising a woven fabric composed of polyamide fiber yarns containing a copper compound in a mixture of a halogenated alkali metal, the copper

compound selected from a group consisting of a copper salt and a halogenated copper, and having a copper concentration in the range of 30 to 200 ppm, and the polyamide fiber yarns containing a plurality of single filaments, each filament having a fineness in the range of 1 to 3.3 decitex, the yarns having a yarn fineness in the range of 66 to 167 decitex, wherein the product of fineness of the warp or weft of the fabric multiplied by the weave density of the fabric being less than 16000 decitex•end or pick, respectively, /2.54 cm, the fabric having the load at 15% elongation in the range of 3 to 35 N/%/2.54 cm, the tensile work at break in the range of 7000 to 30000 N•%/2.54 cm, and a value of fabric strength at break in a range from 740 to 1010 N/2.54 cm.

18. An air bag as defined by claim 17 wherein the fabric is sewn or bonded to have a three-dimensional contour.

19. An air bag as defined by claim 17 wherein the air bag is formed of two woven fabrics interwoven with each other to be a bag-shaped body.

20. An air bag as defined by claim 18 or 19, wherein the product of the fineness of weft multiplied by the weave density of weft is larger than the product of the fineness of warp multiplied by the weave density of warp.

Evidence Appendix to Appeal Brief Under Rule 41.37(c)(1)(ix)

Appellants rely on the following evidence in support of this Appeal Brief:

- Translation of JP 0790747 (Toray), (Exhibit 1), provided by the PTO via facsimile on August 22, 2003
- Table A (Exhibit 2), Present Examples (EX) and the Comparative Examples (CE), prepared by Assignee Asahi Kasei Kabushiki Kaisha, filed by appellants with RCE on August 25, 2003
- Table B (Exhibit 3), Toray Examples (TE) and Comparative Examples (TC), prepared by Assignee Asahi Kasei Kabushiki Kaisha, filed by appellants with RCE on August 25, 2003

Related Proceedings Appendix to Appeal Brief Under Rule 41.37(c)(1)(x)

There are no related proceeding decisions being cited.

EXHIBIT 1

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the base fabric for non coat air bags which is excellent in lightweight nature, flexibility, and receipt nature and by which a mechanical property, permeability, fire retardancy, etc. were improved in more detail about the base fabric for non coat air bags.
[0002]
[Description of the Prior Art] In recent years, wearing of an air bag is progressing quickly as a crew protection safety device of an automobile.
[0003] Since an air bag is usually contained by narrow places, such as a steering wheel and an instrument panel, making the receipt capacity small is called for.
[0004] Therefore, as a military requirement to the base fabric for air bags, folding nature is good as much as possible in the range with which it is satisfied of a mechanical property first, and in order that excelling in receipt nature may be mentioned and it may fill this performance, efforts to make receipt capacity of an air bag into the minimum have been made from the former.
[0005] For example, in a rubber coat base fabric, it is because the direction which used silicone system rubber can lessen the coverage of a rubber coat and a flexible rubber coat base fabric can do this, although the shift to silicone system rubber from a polychloroprene is progressing.
[0006] Moreover, recently, development of the non coat base fabric for air bags which does not use any rubber coat is being furthered. That is, since the non coat base fabric for air bags is the most advantageous from the point of flexibility, receipt nature, and lightweight nature, the utilization as a base fabric for next-generation air bags is expected very often.
[0007] And the technical problem of the non coat base fabric for air bags is improving low permeability, fire retardancy, etc. which are the feature of a rubber coat base fabric to practically satisfying level, maintaining properties, such as the above-mentioned flexibility, receipt nature, and lightweight nature.
[0008] from this viewpoint, many proposals about the base fabric for non coat air bags make conventionally -- having -- **** -- as the typical conventional technology -- JP,4-2835,A, JP,3-134245,A, JP,1-122752,A, and JP,64-70247,A -- calling -- etc. -- the technology of a publication is mentioned
[0009] That is, technology given in JP,4-2835,A indicates the non coat air bag base fabric of low permeability which calenders polyester-fiber textiles and is obtained, and its manufacture method.
[0010] moreover, technology given in JP,3-134245,A is indicated about the non coat base fabric which consists of textiles of the symmetrical organization which calendered, is the fineness of 300 - 400dtex and consists of high contraction thread
[0011] Furthermore, in order to control the permeability of the gas which is a property important as a base fabric for non coat air bags, technology given in JP,1-122752,A uses the base fabric itself as high-density textiles, and indicates the base fabric for non coat air bags further manufactured with the application of contraction processing, heat setting calendering, etc.
[0012] Technology given in JP,64-70247,A is eyes 250 g/m2 further again. By performing calendering to the following base fabrics, the base fabric for non coat air bags which made permeability below 5 cc/cm2 / sec is indicated.
[0013] And it is shown that it is what the base fabric for non coat air bags given in each above-mentioned official report excels [what] in lightweight nature, flexibility, and receipt nature with chloroprene rubber, silicone rubber, etc. as compared with the conventional coat base fabric for air bags by which the coat was carried out, and satisfies a mechanical property, low permeability, etc. practical.
[0014] By the way, although it is most advantageous to consider as high-density textiles using the fiber of narrow single-yarn fineness in order for the above-mentioned property to obtain the most excellent base fabric for non coat air bags, since these textiles are torn and have a fault of a low in the strong force, the actual condition is that an improvement about this point is desired very often.
[0015] however, no conventional technology mentioned above carries out any indication and suggestion about the high-density textiles which consist of fiber of the above-mentioned narrow single-yarn fineness tearing, and improving the strong force
[0016]
[Problem(s) to be Solved by the Invention] this invention is made in order to solve the trouble which the conventional

technology mentioned above has.
[0017] Therefore, the purposes of this invention are the high-density textiles with which a mechanical property, permeability, fire retardancy, etc. which are especially excellent in lightweight nature, flexibility, and receipt nature, and are represented by the tear strong force were improved, and are to offer the base fabric for non coat air bags by which weaving was carried out by the water jet loom (it calls Following WJL) excellent in weaving efficiency.
[0018] This invention persons are the material fiber, even if it is in the non coat base fabric for air bags which consists of high-density textiles using fine-size thread, as a result of inquiring wholeheartedly, in order to attain the above-mentioned purpose. Using what performed the predetermined interlace, by regulating the oily medicine coating weight of textiles in the specific range, it found out that the base fabric for non coat air bags which satisfies many performances made into the above-mentioned purpose was obtained, and this invention was reached.
[0019]
[Means for Solving the Problem] Namely, as for the base fabric for non coat air bags of this invention, a covering factor is characterized [the oil content which the interlace is carried out so that circumstances each synthetic-fiber line of thread which consists of low permeability high-density textiles of under 0.5 cc/cm2 / sec, and which is a base fabric for non coat air bags, and constitutes the aforementioned textiles may have the confounding section with an interval of 10-50mm in underwater / both /, and has adhered to the aforementioned textiles] by being less than 0.1 % of the weight by 2000 or more and quantity of airflow.
[0020] Moreover, the base fabric for non coat air bags of this invention is characterized by the bird clapper from the fiber as which high-density textiles were chosen from Nylon 66, nylon 6, Nylon 46, and the polyethylene terephthalate.
[0021] Furthermore, the base fabric for non coat air bags of this invention is characterized by for the fineness of the fiber line of thread which constitutes high-density textiles being 500 deniers or less, and the fineness of single yarn being 4 deniers or less.
[0022] It is the feature that have the performance by which a mechanical property, permeability, fire retardancy, etc. which the base fabric for non coat air bags of this invention excels [fire retardancy] in lightweight nature, flexibility, and receipt nature, and are represented by the tear strong force were improved, and the predetermined interlace is performed to the material fiber of the textiles which constitute a base fabric, and the oily medicine coating weight of textiles is regulated by the specific range.
[0023] this invention non – the base fabric for coat air bags -- business -- **** -- fiber – it is fiber chosen from Nylon 66, nylon 6, Nylon 46, and the polyethylene terephthalate Although it is desirable to use the fiber which consists of polymers single usually respectively as for these fiber, it may contain 10 or less % of the weight of the copolymerization component. Since it is hard to carry out the silk manufacture especially of the case of Nylon 46 fiber from a high-melting point and the property of high crystallinity with a homopolymer, the copolymerization polyamide fiber containing about 5% of the weight of a copolymerization component, for example, an epsilon caprolactam, is more desirable rather.
[0024] Since the hollow cross-section fiber concerning this invention satisfies the energy which absorbs a shock when the air bag which expanded asks crew, it needs [the mechanical property of a base fabric, i.e., the intensity of the base fabric which can be equal to momentary expansion of gas an impact strength, bursting strength, tear strength, etc.] to use a high-polymer polymer. Specifically, in the case of Nylon 66, nylon 6, and Nylon 46 fiber, in the case of 3.0 or more and a polyethylene terephthalate, 0.8 or more are required of intrinsic viscosity ([eta]) at sulfuric-acid relative viscosity (etar).
[0025] Moreover, it is the purpose which prevents heat deterioration while the base fabric for non coat air bags concerning this invention is kept as the heat history under line-of-thread manufacture, and a product and being used, photodegradation, oxidization degradation, etc., and, in the case of Nylon 66, nylon 6, and Nylon 46 fiber, it is desirable to make an antioxidant contain. It is desirable to add preferably inorganic [, such as iodation copper, a copper bromide, a copper chloride, copper acetate, copper pyrophosphate, and stearin acid copper,] and 10-300 ppm of 20-150 ppm of organic-acid copper as copper, and to carry out combined use content of alkali-halide metals, such as a potassium iodide, a potassium bromide, potassium chloride, a sodium iodide, a sodium bromide, a sodium chloride, a lithium iodide, a lithium bromide, and a lithium chloride, a halogenation earth metal, or the 4th class ammonium-halide salt 0.05 to 0.5% of the weight as an antioxidant,. 10-500 ppm is made to contain by making organic and an inorganic phosphorus compound into phosphorus at ** and others if needed.
[0026] Moreover, in the case of a polyethylene terephthalate fiber, it is the purpose which prevents hydrolysis, and it is carboxyl-end-group concentration 30eq/106 It is 20eq/106 preferably hereafter. Considering as the following is desirable. The polyethylene terephthalate fiber with few carboxyl end groups can be obtained by the method of adding at a spinning process by making adoption, an epoxy compound, a carbodiimide compound, an oxazoline compound, etc. of a low-temperature-polymerization method into an end blockade agent etc.
[0027] The fineness of the fiber which constitutes the base fabric for non coat air bags concerning this invention is usually 500 deniers or less, and this fineness is equivalent to the fineness of the upper limit which can carry out weaving efficiently in WJL suitable for weaving of the base fabric for non coat air bags of this invention.
[0028] On the other hand, although fineness is as advantageous as a narrow in respect of lightweight nature, flexibility, and receipt nature, in order to consider as the level with which it can be satisfied of the mechanical property of a base fabric practically, as for a minimum, it is desirable that it is 210 deniers.
[0029] Moreover, 4 deniers or less of single-yarn fineness of the fiber which constitutes the base fabric for non coat air bags concerning this invention are 3 deniers or less preferably. Since a narrow will become flexible [the base fabric for air bags],

and compact if thin, single-yarn fineness is desirable.
[0030] Furthermore, when single-yarn fineness is 4 deniers or less, the ITA race between single yarn tends to start firmly, and it has the feature that tear after weaving rather than the base fabric for air bags using the narrow fiber of the conventional single-yarn fineness, and its strong force is high since an interlace is held.
[0031] however, the grade by which the flexibility and receipt nature of the effect of this invention, especially the base fabric for air bags will not be improved enough, and an advanced interlace will remain after WJL weaving if single-yarn fineness exceeds 4 deniers -- firm interlace processing -- ****** -- since things become difficult, it is not desirable
[0032] The permeability of the base fabric for this invention non coat air bags is the low permeability textiles below 0.5 cc/cm2 / sec, and a covering factor consists of 2100 or more high-density textiles preferably 2000 or more.
[0033] Here, a covering factor (K) is the value calculated by the following formula from the product of the square root of textile composition density and the fineness of a fiber line of thread.
K=Nw xDw 1 / 2+NF xDFs 1/2, however Nw : Warp density (inch/)
Dw : warp denier NF : Woof density (inch/)
DF : woof denier.
[0034] Circumstances each synthetic-fiber line of thread which constitutes the base fabric for non coat air bags of this invention is characterized by carrying out the interlace so that it may have the confounding section with an interval of 10-50mm in underwater [both].
[0035] That is, in the line of thread, when the base-fabric textiles concerning this invention are disassembled into circumstances each line of thread and it is immersed underwater, respectively, the interlace remains so that it may have the confounding section with an interval of 10-50mm.
[0036] The tear strong force of textiles declines as the tear strong force of textiles generally has few oil contents which fell and adhered to textiles as the single-yarn fineness of a line of thread becomes thin, and friction between circumstances lines of thread becomes high.
[0037] Therefore, in order to prevent the fall of the strong force [tear / this], it is effective to complete the filament which strengthens the above-mentioned interlace comparatively and constitutes a line of thread.
[0038] After carrying out weaving by WJL, in order to make it sufficient interlace remain like the base fabric for non coat air bags of this invention, it is required to apply a comparatively firm interlace to the line of thread before weaving, and the line of thread to which 40 or more interlaces were applied with CF value is used.
[0039] however, survival -- when the line of thread which decomposed this base fabric into the circumstances line of thread in the conventional base fabric for non coat air bags by which weaving was carried out by WJL characterized when an oil content is less than 1 % of the weight is immersed underwater, the interlace to the extent that a recurrence interval can be measured clearly does not remain
[0040] moreover, this invention non -- the base fabric for coat air bags -- remains of an oily medicine -- it is the feature that the oil content has adhered only less than 0.1% of the weight
[0041] Generally, since the oily medicine for synthetic fiber fiber has the ignition point and the ignition point lower than the synthetic fiber itself, when 0.1% of the weight or more of the remains oily medicine has adhered, the fire retardancy of the base fabric for non coat air bags may fully be unable to be secured.
[0042] On the other hand, if it is woven in while the oily medicine had once adhered, since the non coat air bags of this invention were the high-density textiles which made permeability hold below to constant value as described above, even if the oily medicine in textiles passes through a subsequent refinement process, washing removal of it cannot fully be carried out.
[0043] Therefore, the base fabric for non coat air bags of this invention means substantially that it is the base fabric which carried out weaving by WJL which can wash an oily medicine at the time of weaving.
[0044] Moreover, it is important for the oily medicine adhering to raw thread to choose what is sufficiently easy to be washed during WJL weaving.
[0045] As a performance demanded from the oily medicine used by the base fabric for non coat air bags concerning this invention ** Friction with thread and a metal roll is small, and an oil film is strong enough to the extreme pressure at the time of a line of thread and a metal touching by high tension so that the silk manufacture of the generating of the thread breakage or a fluff can be carried out few, ** So that the interlace for converging that the oily medicine deposited on the heating roller cannot cause thermal oxidation decomposition easily and ** filament may tend to start It is required to mention that friction with thread and thread is moderately high, that it is easy to wash at **WJL weaving process, etc., and to have these performances in balance.
[0046] As an oily medicine which fills this performance, a lubricating agent component, an activator component, and the extreme pressure agent of a minute amount, What consists of additive components, such as an antielectric agent and an antioxidant, etc. is used. The bivalent fatty-acid-ester compound which contains the ester oxide of the "molecular weight 600-1000 20 to 50% of the weight as an example of a desirable oily medicine constituent (A), molecular weight -- 1000 - 5000 -- polyester -- a system -- an activator -- (-- B --) -- and -- molecular weight -- 600 - 1000 -- diethylene -- oxide -- 25 - 55 -- % of the weight -- containing -- polyethylene -- a glycol ester -- a compound -- (-- C --) -- mixture -- " -- mentioning -- having .
[0047] Next, about the manufacture method of the base fabric for non coat air bags of this invention, it summarizes below.
[0048] The raw thread concerning the base fabric for non coat air bags of this invention is manufactured by carrying out melt

spinning extension of a polyamide or polyethylene-terephthalate polymers, such as Nylon 66, Nylon 46, and nylon 6.
[0049] As for the above-mentioned raw thread, it is desirable to be manufactured using a high-polymer polymer, in order to satisfy the mechanical property of a base fabric, and when it is Nylon 66, nylon 6, and Nylon 46, it is desirable to use 0.8 or more polymers with intrinsic viscosity ([eta]) with sulfuric-acid relative viscosity (etar) in the case of 3.0 or more and a polyethylene terephthalate.
[0050] Moreover, it is the purpose which prevents heat deterioration while the base fabric for non coat air bags concerning this invention is kept as the heat history under line-of-thread manufacture, and a product and being used, photodegradation, oxidization degradation, etc., and, in the case of Nylon 66, nylon 6, and Nylon 46 fiber, it is desirable to make an antioxidant contain.
[0051] On the other hand, in the case of a polyethylene terephthalate fiber, it is the purpose which prevents hydrolysis, amine decomposition, etc., and it is a carboxyl end group 30eq/106 It is 20eq/106 preferably hereafter. Considering as the following is desirable.
[0052] In a spinning process, melt spinning of the above-mentioned polymer is carried out, and an oily medicine is given to the line of thread by which cooling solidification was carried out.
[0053] An oily medicine is given as a solution which diluted the above-mentioned oily medicine component with low-molecular-weight straight mineral oil or water, and the oily medicine coating weight to fiber is usually 0.5 - 1.0 % of the weight 0.3 to 1.5% of the weight.
[0054] The line of thread to which the above-mentioned oily medicine was given is usually continuously sent to an extension process, and extension heat treatment is carried out. As for extension, two or more steps of multi-stage hot-rolling growth methods are usually adopted. A heat set is carried out, ********** applies an interlace to a line of thread just before ******, and the extended line of thread converges both filaments.
[0055] An interlace is performed by a high-pressure fluid, for example, high-pressure air, or high-pressure steam out from the periphery of a line of thread through a nozzle.
[0056] Some raw thread manufactured by the above method is sent to a warping process, it is ****(ed) by the warping beam as an object for warp, and a part is prepared as the woof and weaving is carried out by WJL.
[0057] A covering factor uses the base fabric for non coat air bags of this invention as 2000 or more high-density textiles so that quantity of airflow may become under 0.5 cc/cm2 / sec. For example, in carrying out weaving with plain weave using 420-denier Nylon 66 raw thread, warp and the woof make a placing number 50 or more per inch. It considers as 2100 or more covering factors high-density textiles still more preferably.
[0058] Weaving of the WJL is preferably carried out efficiently at the above woof placing speed by 1000m/a minute about 800m /or more. usually, most oily medicines adhering to raw thread carry out washing removal during this weaving -- having -- remains -- an oil content -- an amount becomes less than 0.1 % of the weight
[0059] The heat setting of the gray goods by which weaving was carried out is led and carried out to a heat setting process as it is, without usually passing through a refinement process.
[0060] At this heat setting process, in order to control the permeability as a base fabric for non coat air bags, or in order to control a hand and flexibility, you may calender to one side or both sides.
[0061] Whenever the base fabric for non coat air bags of this invention manufactured by the above method is shown below, it has the physical properties which came and were excellent.
[0062] (1) Covering factor (K)
K>=2000 (2) tensile strength (S)
S>=160kg / 3cm (JIS K6328 5.3.5)
(3) The degree of breaking extension (E)
15<=E>=35% (JIS K6328 5.3.5)
(4) Powerful [tear and] (TS)
TS>=15kg (JIS K6328 5.3.6)
(5) Quantity of airflow (P)
P<=0.5 cc/cm2 / sec (the JIS L1096 6.27A method)
(6) Flammability (B)
A part for B<=50mm/(FMVSS No.302).
[0063] The base fabric for this invention non coat air bags which has this property is lightweight and flexible, and is excellent in receipt nature and a mechanical property, and has sufficient performance practical also about non-permeability and fire retardancy.
[0064] Especially, although it is lightweight and flexible and is advantageous in respect of receipt nature compared with a conventional chloroprene rubber coat and a conventional silicone rubber coat base fabric, it also has the merit that it can manufacture still more cheaply.
[0065] this invention non which has the above merit -- the base fabric for coat air bags -- a driver's seat and a crew seat -- it is employable as all
[0066] Next, the following examples show one mode of this invention concretely.
[0067] The Nylon 66 chip with which [example] sulfuric-acid relative viscosity (1 % of the weight of sample concentration, 25 degrees C) contains 100 ppm for phosphorus, and contains 80 ppm and a potassium iodide for copper 0.1% of the weight

as an antioxidant by 3.5 was fused by the extruder type spinning machine.
[0068] In addition, the melting polymer was spun from the posterior-orifice golden pore filtered in the spinning pack. a hole various with pore with a diameter of 0.25mm in a mouthpiece -- what has a number was used, respectively
[0069] After spinning thread passed through the annealing zone directly under a mouthpiece, cooling solidification of it was carried out with cold blast. Subsequently, after giving the oily medicine diluted with the higher hydrocarbon to 20% of the weight to a line of thread, the taking over roll took over the speed for 900m/.
[0070] Subsequently, the same oily medicine as the above was given with the undiluted solution, applying 5% of stretch to a line of thread between a taking over roll and an yarn feeding roll.
[0071] The oily medicine used here is a non-[mixed] drainage system oily medicine which consists of additives, such as a lubricating agent component, an activator component and an extreme pressure agent of a minute amount, an antielectric agent, and an antioxidant, etc.
[0072] To the fiber scraped off after extension, 0.5 to 1.5% of the weight, the oily medicine took over the remainder about 0.2 to 0.5% of the weight before the taking over roll, and gave it between the roll and the yarn feeding roll so that it might become 0.6 - 1.2 % of the weight preferably.
[0073] Next, the line of thread was continuously sent and extended at the extension process. After carrying out two-step hot-rolling growth of the extension heat treatment, it was performed by the one-step relaxation approach.
[0074] That is, in 60 degrees C and the 1st extension roll temperature, 120 degrees C and the 2nd extension roll temperature made [the taking over roll / un-heating and the yarn feeding roll] the relaxation roll after 240 degrees C and extension 120 degrees C.
[0075] Draw magnification made the 1st step 3.56 times, and made the 2nd step 1.25 times, and the rate of relaxation in relaxation processing was made into 8%.
[0076] And it scraped off, after applying an interlace so that it may scrape off and the number of the confounding sections may become per [0-80piece] m to the last line of thread.
[0077] As properties, such as a material polymer, fineness, the number of filaments, and single-yarn fineness, showed in Table 1 (example) and 2 (example of comparison) by the above-mentioned method, variously different raw thread was obtained, and the feature was collectively shown in Tables 1 and 2.
[0078]
[Table 1]

		実施例1	実施例2	実施例3	実施例4	実施例5
ヤ		N66	N66	N66	N66	PET
硬度相対粘度		3.6	3.6	3.6	3.6	-
固有粘度		-	-	-	-	0.93
止剤		銅 100ppm 燐 80ppm 酸化防止剤 0.1%	銅 100ppm 燐 80ppm 酸化防止剤 0.1%	銅 100ppm 燐 80ppm 酸化防止剤 0.1%	銅 100ppm 燐 80ppm 酸化防止剤 0.1%	- - -
キシル末端基	(eq/10^6 g)	-	-	-	-	18
度	(D-111)	420-144	420-144	420-218	315-144	420-210
度	(d)	2.8	2.9	1.0	2.8	1.9
度	(D)	421	421	422	315	420
度	(g/d)	9.8	9.8	9.7	8.7	8.8
度	(%)	22.2	22.2	22.5	22.8	14.3
縮率	(%)	1.8	1.8	1.8	1.8	9.8
収縮率	(%)	8.1	8.1	8.2	8.2	-
	(-)	65	65	74	88	80

[redacted]

[Table 2]
【表2】

	比較例1	比較例2	比較例3	比較例4
ポリマ	N66	N66	N66	PET
粘度 硫酸相対粘度	3.6	3.6	3.6	-
固有粘度	-	-	-	0.93
酸化防止剤	銅 100ppm	銅 100ppm	銅 100ppm	-
	銅 80ppm	銅 80ppm	銅 80ppm	-
	[illegible] 0.1%	[illegible] 0.1%	[illegible] 0.1%	-
カルボキシル末端基 ($eq/10^6$ g)	-	-	-	18
繊度構成 (D-f11)	420-72	420-72	420-144	420-216
単糸繊度 (d)	5.8	5.8	2.8	1.9
繊度 (D)	422	422	421	420
強度 (g/d)	9.8	9.8	9.7	8.9
伸度 (%)	22.0	22.4	22.4	14.5
乾熱収縮率 (%)	1.7	1.7	1.7	9.6
沸騰水収縮率 (%)	6.1	6.1	6.1	-
CF値 (-)	28	24	35	85

Next, weaving of the gray goods was carried out using these raw thread. namely, some raw thread -- a warping beam -- carrying out -- a part -- the woof -- carrying out -- Tsuda -- Piece -- make -- WJL -- it used, weaving was carried out by part . for 1000m/in woof placing speed, and it considered as gray goods

[0079] and the circumstances textiles density in this case, a covering factor, and a weaving machine -- a type and the existence of calendering were changed as shown in Table 3 (example) and 4 (example of comparison), and various gray goods were obtained

[0080] In addition, in the example 3 of comparison shown in Table 4, weaving was carried out by the rapier loom using the same raw thread, and in order to remove an oily medicine subsequently, gray goods were obtained by letting a refinement process pass. Refinement in this case was performed by passing under the 70-degree C hot bath containing a scouring agent for 2 minutes.

[0081] And the heat setting of each gray goods was carried out at 180 degrees C, and the base fabric for non coat air bags was obtained.

[0082] About each obtained base fabric, the result which evaluated many performances as a base fabric for air bags was collectively shown in Tables 3 and 4.

[0083]

[Table 3]

[Table 4]

【表3】

	実施例1	実施例2	実施例3	実施例4	実施例5
織物密度 経×緯 (本/インチ)	55 ×55	55×55	55×55	70 ×70	86×86
カバーファクター(－)	2254	2254	2254	2485	2705(2218##)
織織タイプ	WJL	WJL	WJL	WJL	WJL
カレンダー加工有無	無	有	無	無	有
織物分解糸条の水中における交絡部の間隔 (mm)	35	30	35	32	31
残留油分量 (%)	0.03	0.03	0.02	0.02	0.02
引張り強力 (kg/3cm)	208 ×210	190×188	208 ×202	220 ×215	201×192
破断伸度 (%)	32 ×28	34×29	34 ×28	32 ×28	30 ×24
引裂強力 (kg)	45 ×43	42×41	42 ×40	38 ×36	38×33
通気量 (cc/cm^2/sec)	0.12	0.08	0.10	0.12	0.08
柔軟性 (mm)	65 ×70	60×66	58 ×63	57×59	60×62
燃焼性 (mm/分)	15	20	25	25	28

(※ : × の表示はそれぞれ経方向×緯方向の物性値を示す。
##:( ) 内はポリアミド密度に換算した値を示す。)

【表４】

	比較例１	比較例２	比較例３	比較例４
織物密度　経×緯（本／インチ）	46×46	55×55	55 ×55	66 ×66
カバーファクター（－）	1885	2254	2254	2705(2218##)
織機タイプ	ＷＪＬ	ＷＪＬ	レピア	ＷＪＬ
カレンダー加工有無	無	無	無	有
織物分解糸紙の水中における交絡部の間隔（ｍｍ）	180	105	82	112
残留油分量（％）	0.02	0.01	0.41	0.08
引張り強力（kg/3cm）	212 ×210	245×232	240×238	211 ×201
破断伸度（％）	30 ×28	35 ×30	38×31	28 ×24
引裂強力（ｋｇ）	44 ×42	38 ×37	43×40	35 ×31
通気量(cc/cm^2 /sec)	0.72	0.65	0.12	0.70
柔軟性（ｍｍ）	76×85	68 ×70	67 ×69	61 ×65
燃焼性（mm/ 分）	42	35	35	45

（＊：×　の表示はそれぞれ経方向×緯方向の物性値を示す。
＊＊：（ ）内はポリアミド密度に換算した値を示す。）

The covering factor specified by this invention so that clearly from the result of Table 3 and 4 (2000 or more), They are the high-density textiles of quantity-of-airflow (under 0.5cc [/cm] 2 / sec) **. and low adhesion -- the base fabric for non coat air bags (examples 1-5) of this invention which fulfills the conditions of an oil content (0.1 or less % of the weight) As compared with the base fabric for air bags for comparison (examples 1-4 of comparison) which does not fulfill a part or all of these conditions, all performances, such as low permeability, fire retardancy, flexibility and a mechanical property, especially tear strong force, are satisfied.

[0084] Moreover, the circumstances line of thread which constitutes the textiles of this invention requires an interlace also in underwater (10-80 pieces/(m)), fineness is 500 deniers or less, and it turns out that single-yarn fineness is 4 or less Dale's conditions.

[0085]

[Effect of the Invention] Since the base fabric for non coat air bags of this invention has a mechanical property equivalent to the conventional polychloroprene rubber coat base fabric and a silicone rubber coat base fabric and has low permeability and fire retardancy practically sufficient as a base fabric for air bags, it can be changed and adopted as the aforementioned rubber coat base fabric.

[0086] in order that [and] the base fabrics for non coat air bags of this invention may be points, such as lightweight nature, flexibility, and receipt nature, may be excellent as compared with the conventional rubber coat base fabric and may acquire this feature enough especially -- from a line of thread with a fineness [of 500 deniers or less], and a single-yarn fineness of 4 deniers or less -- also becoming -- it did not buy but has fully been improved -- it tears and has the strong force

[0087] Moreover, since weaving of the base fabric for non coat air bags of this invention is carried out by efficient WJL and a rubber coat moreover is not needed, the base-fabric manufacturing cost has a thing merit called a low.

[0088] therefore, this invention -- many [to improvement in the rate of air bag wearing desired since it is crew protection of an automobile / non, / since both the base fabrics for coat air bags have the above-mentioned performance and the advantageous manufacturing cost] -- it can be alike and can contribute

---

[Translation done.]

EXHIBIT 2

Table A Present Examples (EX) and Comparative Examples (CE)

	EX1		EX2		EX3		EX4		EX5		EX6		CE1		CE2		CE3		CE4	
Fabrics																				
Weave density ends/2.54 cm; picks/2.54 cm	95	93	95	93	95	93	90	98	94	94	142	142	95	93	95	93	192	190	78	75
Strength at break kg/3 cm																				
N/2.54 cm	1010	930	900	850	770	740	963	983	951	941	760	740	998	872	1000	871	564	559	1326	1275
Tensile work (Estimated.)	17675	12555	20250	14450	20790	15910	16853	13271	19020	12704	14060	9620	7984	6540	8000	6097	1974	4752	13260	19125
N·%/2.54 cm (measured value)	20500	13500	20600	14500	17500	13600	17800	14900	20500	14000	12500	8000	20000	12000	20500	12000	6000	5900	30000	26000
Tensile work/g·fabric N·%·m²/2.54 cm/g	303	220	347	253	356	279	305	220	329	220	322	221	137	114	137	107	47	113	185	278
Cover factor	2224		2224		2224		2224		2224		2376		2224		2224		2701		2243	
Weave fineness dtex·end/2.54 cm; dtex·picks/2.54 cm	14820	14508	14820	14508	14820	14508	14040	15288	14664	14664	11076	11076	14820	14508	14820	14508	10752	10640	18174	17475
Elongation at break %	35	27	45	34	54	43	35	27	40	27	37	26	16	15	16	14	7	17	20	30
Basis of weight (measured) g/m²	125	125	125	125	125	125	125	125	125	125	94	94	125	125	125	125	92	92	152	152
Basis of weight (estimated) g/m²	115		115		115		115		115		87		115		115		84		140	
(warp, weft)	58	57	58	57	58	57	55	60	58	58	44	44	58	57	58	57	42	42	72	69
Yarns (warp, weft)																				
yarn size dtex	156	156	156	156	156	156	156	156	156	156	78	78	156	156	156	156	56	56	233	233
denier	140	140	140	140	140	140	140	140	140	140	70	70	140	140	140	140	50	50	215	215
Fineness of single filament dtex/filament	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	1.6	1.6	6.7	6.7

EXHIBIT 3

Table B Toray Examples (TE) and Comparative Examples (TC)

	TE1		TE2		TE3		TE4		TE5		TC1		TC2		TC3		TC4	
Fabrics																		
Weave density ends/2.54 cm; picks/2.54 cm	55	55	55	55	55	55	70	70	66	66	46	46	55	55	55	55	66	66
Strength at break kg/3 cm	203	210	190	188	208	202	220	215	201	192	212	210	245	232	240	233	211	201
N/2.54 cm	1686	1744	1578	1561	1727	1677	1827	1785	1669	1594	1760	1744	2034	1926	1993	1935	1752	1669
Tensile work (estimated.) N·%/2.54 cm	26968	24411	26819	22634	29359	23481	29226	24992	25033	19130	26403	22667	35599	28894	35869	29986	25403	20027
(measured value)																		
Tensile work/g·fabric N·%·m²/2.54 cm/g	265	240	264	222	288	231	303	259	205	157	310	266	350	284	352	295	208	164
Cover factor	2257		2257		2260		2489		2705		1890		2260		2257		2705	
Weave fineness dtex·end/2.54 cm; dtex·picks/2.54 cm	25850	25850	25850	25850	25850	25850	24500	24500	31020	31020	21620	21620	25850	25850	25850	25850	31020	31020
Elongation at break %	32	28	34	29	34	28	32	28	30	24	30	26	35	30	36	31	29	24
Basis of weight (measured) g/m²																		
Basis of weight (estimated) g/m²	204		204		204		193		244		170		204		204		244	
(warp, weft)	102	102	102	102	102	102	96	96	122	122	85	85	102	102	102	102	122	122
Yarns (warp, weft)																		
yarn size dtex	470	470	470	470	470	470	350	350	470	470	470	470	470	470	470	470	470	470
denier	421	421	421	421	422	422	316	316	420	420	422	422	422	422	421	421	420	420
Fineness of single filament dtex/filament	3.3	3.3	3.3	3.3	3.3	3.3	2.4	2.4	2.2	2.2	6.5	6.5	6.5	6.5	3.3	3.3	2.2	2.2